

A New Geophysical Method for Monitoring Emplacement and Verifying Performance of Subsurface Barriers

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Abstract

Visualizing subsurface structures is an old and venerable problem. Many geophysical methods have been developed to meet the challenge and some of these have already been applied to visualizing placement of subsurface barriers. Unfortunately, none of these methods have yet demonstrated the ability to yield detailed structure or to reliably evaluate their performance.

Electrical resistance tomography (ERT) is a relatively new geophysical technology which has already proven useful for imaging many underground process. In this paper we discuss how this method may have the capability for high resolution imaging of barriers--for both monitoring their emplacement as well as verifying their performance.

This paper describes the state of ERT technology, summarizing its capabilities as well as its limitations. Then we will demonstrate how the method might be used by showing relevant case histories of high resolution images of subsurface processes. Three dimensional images can be generated which might map barrier boundaries or delineate missed zones. The high speed data acquisition and image reconstruction may even make possible near real time information to guide barrier construction or augmentation. We will show how ERT may also verify barrier integrity by imaging the path of gaseous or liquid tracers which will modify subsurface resistivity.

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